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Group

SCIENCE IN PARLIAMENT

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DIGITAL NATO

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Stephen Metcalfe MP
Chairman, Parliamentary & Scientific
Committee (All-Party Parliamentary
Group)

A warm welcome to the Autumn edition.

My thanks to our distinguished contributors and to the Institute of Innovation and Knowledge Exchange (IKE) for providing us with another striking front cover.

Following the Summer Parliamentary Recess, I chaired, on the 18th September, the first of our three Autumn discussion meetings. The theme was *Digital Health in the 21st century*, and we were very pleased to be partnered by Northumbria and Newcastle Universities.

By the time this edition reaches you I will have welcomed to

Parliament the Rosalind Franklin Institute, sponsors of our 16th October meeting, the subject of which was *Changing how we see life*.

On November 20th The Physiological Society will be partnering P&SC in a meeting on *The impact of extreme heat on vulnerable populations*.

I thank our sponsoring organisations, their teams, and the excellent speakers who make these informative gatherings such a success.

My thanks to our Programme Committee, chaired by Carol Monaghan MP, who are arranging the meetings programme well into 2024.

Preparations are already underway for the 27th annual STEM for BRITAIN which takes place on Monday 4th March. The 2024 competition for Early Career Researchers in Parliament was launched on Monday 18th September.

The closing date for submissions is **Monday 27th November**. Please encourage applications through your various

academic and scientific society networks.

In July I was very pleased to welcome to P&SC Viscount Hanworth and Lord McNicol as Parliamentary Members.

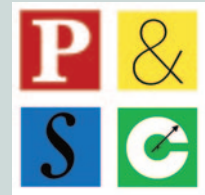
Regrettably I must end on a sad note, to record the passing on 2nd July of Dr Douglas Naysmith, one of my predecessors as Chairman of the Parliamentary & Scientific Committee.

Doug was Member of Parliament for Bristol North West from 1997 to 2010 and served with distinction on a number of Commons Select Committees, including Health and Social Care, and Science and Technology.

With his partner, Sue Wharton, Doug continued to support P&SC, particularly STEM for BRITAIN, which he had been instrumental in resurrecting in the 1990s. Sue has written an appreciation of Doug, which you can read on page 19 of this journal. Doug was a warm and delightful man whom we will greatly miss.



The Journal of the Parliamentary and Scientific Committee (All-Party Parliamentary Group).



Science in Parliament has two main objectives:

1. to inform the scientific and industrial communities of activities within Parliament of a scientific nature and of the progress of relevant legislation;
2. to keep Members of Parliament abreast of scientific affairs.

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INNOVATION AND DIGITAL TECHNOLOGIES: UNDERPINNING NATO'S WARFARE DEVELOPMENT AGENDA



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Innovation and digital technologies have taken centre stage in redefining the contours of defence and security. Since its inception in 1949, NATO (North Atlantic Treaty Organization) has evolved continuously to adapt to emerging threats and changing geopolitical landscapes.

In an era delineated by rapid technological advancement, 'Digital Capability' has emerged as the new force reshaping defence and security strategies worldwide. This evolving arsenal is not characterised by bullets and missiles, but by lines of code, predictive analytics, and a mesh of Artificial Intelligence algorithms. Digital pervasiveness signifies a seismic-shift from traditional military planning and doctrine to that of a sophisticated and rapidly changing battlefield, where data and cyber capabilities are the cornerstone^{1,2}. Through the IKE Institute's work with NATO's Allied Command Transformation (ACT), we shall shed some light on the pivotal role of innovation and digital technologies play in realising NATO's strategic priorities and its future positioning.

THE KINETIC-DIGITAL BLEND

Kinetic forces are increasingly being equipped with digital technologies to enhance their capabilities. For example, Artificial Intelligence (AI) and Machine Learning (ML) are being used to improve targeting, reconnaissance, and logistics, enabling more effective and efficient operations. The integration of digital technologies

has resulted in a blended form of warfare where both kinetic and digital capabilities are utilised concurrently.

TRANSFORMING NATO'S STRATEGIC IMPERATIVE

In recent years, NATO has laid out a comprehensive roadmap for the future of its collective defence initiatives outlined in its new Strategic Concept in Madrid on 29 June 2022. Central to this roadmap is the Warfare Development Agenda, which prioritises novel warfighting capabilities to address emerging threats and challenges and underpin NATO's three core tasks – *deterrence and defence; crisis prevention and management; and cooperative security*³. Innovation and digital technologies form a central plank in underpinning NATO's capability to meet the alliance's 2030 aspiration of cohering multidomain operations, ensuring seamless interoperability across all domains, strengthening situational awareness at the point of need, and enhancing political consultation through data-driven decision-making processes. So, let's take a look at NATO's approach to commencing Digital Transformation⁴.

TOWARDS A DIGITALLY-ACTIVATED NATO

"Embracing digital transformation and innovation is no longer merely an option; it is an imperative. Our journey has commenced. It continues to evolve to harmonise the physical and virtual worlds creating a formidable force that is agile, adaptive, and ahead of the curve. Our commitment to harnessing cutting-edge technologies ensures that our Alliance is not only prepared, but is always a step ahead. Navigating this journey with the IKE Institute and other partners within our ecosystem is an exciting one that is gaining significant momentum."

Vice Admiral Guy Robinson
CB OBE

Chief of Staff, NATO Allied
Command Transformation

Agreed by the alliance in October 2022, NATO's Digital Transformation Vision sets out a comprehensive approach to embracing new and emerging digital technologies. A new paradigm that triangulates

people, process, and technology, and ensures data and analytics form the connective tissue has emerged, as shown in Figure 1.

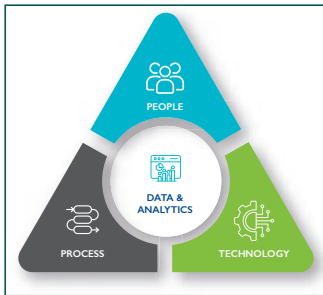


Figure 1: Key Pillars in Digital Transformation

STARTING WITH THE PEOPLE DIMENSION

Recognising that human capital was the most valuable asset, enabling or inhibiting the achievement of a desired outcome from DT, creation of a baseline position for digital literacy and dexterity has been ACT's Supreme Allied Commander and his Chief of Staff's shared strategic ambition. Establishing a DT lexicon to ensure consistency in the shared understanding of what DT meant to individuals and their functions, has been the starting point to help forge the new Kinetic-Digital capability. A designated Digital Champion role to corral participation and coordinate digital initiatives within ACT has also been established.

The IKE Institute developed and run a comprehensive series of certified educational and immersive training programmes in innovation and digitalisation. Examples of such programmes include:

- Understanding Digital Transformation

- Digital Transformation for NATO
- Warfighting in the Digital Age
- Certified Innovation Leader
- Certified Innovation Practitioner
- Prioritising for Innovation Success

Structured individual and group mentoring and support activities are also provided to help identify high value learning experiences and create actionable development plans for participants.

THE PROCESS DIMENSION

Process automation relies on having the right data in the right format and from the right sources. Aspects of data – *volume, veracity, velocity, variety* (i.e. how many points of reference are used to collect data) – have been part of building the initial understanding as to where the gaps may be within operational chains in a process. Any gaps in a data chain impedes coherency and consistency of actionable outcomes. Therefore, a review of data flows (*data chains*) at 'lines of delivery' level is being undertaken, as outlined in Figure 2.

The use of universal *digital libraries* that are validated and verified provided a valuable aid when defining the data chains in a process. Applications for process automation such as the Microsoft Power Automate – a Software as a Service platform (SaaS), offered a useful and readily accessible tool for exploring how to automate

recurrent tasks. In addition, the Microsoft Power Platform, which includes Power Apps and Power BI also provided an effective interactive data visualization environment for Workflow Automation. These 'No Code/Low Code' platforms continue to help users to define workflows and use knowledge graphs to create custom applications, and visualise their own solutions in line with project needs, without any knowledge of how coding works. Quality, security, privacy, and process lifecycle continue to form key considerations as part of introducing new digital process flow.

The hands-on training sessions, in using these tools, generated great enthusiasm and a slew of potential ideas for use cases. Exposure to agile practices such as DevOps and DevSecOps provided an effective accelerant to enhance teams' abilities to continuously deliver, monitor and scale applications and services rapidly.

THE TECHNOLOGY DIMENSION

In selecting from the expansive range of new and emerging digital technologies (EDT) such as AI/ML, Internet of Things (IoT), Augmented and Virtual Reality (AR/VR), Cloud and Edge computing and 5G amongst others, the focus here has been on considering which combination of EDT can create an *end-to-end experience total experience* for warfighter/civilian user, and integrate touchpoints at local, enterprise and federated levels⁵.

The "Everything-as-a-Service" notion is being used to: establish a set of guardrails ensuring integration with existing systems and platforms, assuring future-proofing, and enabling scalability. It's worth highlighting here that users only value what technologies can do for them and their functions! That means deploying EDT has to result in either *optimisation* of a task, process, or function; or *transformation* – offering new, innovative ways of creating and delivering value, in terms of gains and benefits, as outlined in Figure 3.

Technology selection continues to be guided by operational needs and their associated use cases. And therefore, this has mandated the need to establish technology development horizons, and define their associated implementation roadmaps.

THE DATA AND ANALYTICS DIMENSION

Undoubtedly, data is the key to unlock Digital Transformation. From the outset, the focus has been on understanding and agreeing data policies, and establishing data management strategies. Another focus related to this, has been on embracing standards. For example – the ISO/IEC 5259 guidelines for data governance, data quality assessment, measurement and improvement of datasets training and operation is being used to support the drive for interoperability and integration of different federated systems. A resilient and scalable digital backbone is also being



Figure 2: Steps in Developing Digital Workflows

architected with the support of NATO's Communications and Information Agency- NCIA.

within NATO enterprise, and across the nation members' digital defence and security organisations.

influence diplomacy or 'digital diplomacy'. NATO is likely to leverage digital platforms to negotiate, collaborate, and build

start-ups to advance the alliance's technological capability. The fund will focus on areas including artificial intelligence, space, and biotechnology. This transformation, grounded in innovation, underscores NATO's commitment to safeguarding peace and security in an increasingly uncertain digital world.

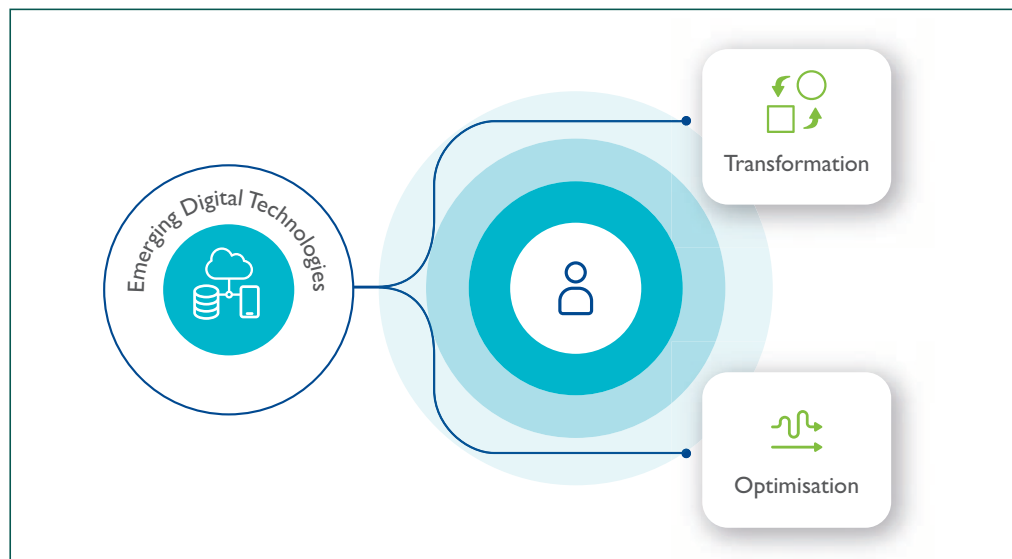


Figure 3: Outcomes of Deploying New and Emerging Digital Technologies

Analytics – a statistical technology with quantitative methods used to gain insights, predict shortcomings, uncover patterns, develop responses, and build strategies accordingly – is being introduced to provide invaluable input for advancing command and control, optimising logistics, supply-chains, and resources management, amongst many other decision-making requirements.

Currently, NATO aims to enhance its data exploitation efforts. In October 2021, NATO's Defence Ministers endorsed an Artificial Intelligence strategy, to accelerate and enhance a range of alliance capabilities. Subsequently, in October 2022, a NATO Data and Artificial Intelligence Review Board supported by an Autonomy Implementation Plan has been established, to ensure ethical and responsible use of these technologies. The recent establishment of the Office of the Chief Information Officer is now providing a steer in the DT strategy and its foundational elements, as well as advocating and coordinating its implementational solution paths

DIGITAL NATO: UNDERPINNING ALLIANCE WARFARE CAPABILITY

The growing prevalence of hybrid threats is mandating the need for NATO to ensure its warfare development agenda (WDA) is digitally enabled, thus delivering an integrated and interoperable multidomain operations defence capability^{6,7}. Digital Innovation is the "golden thread" that cuts across all aspects of the WDA. NATO Commanders continue to build their knowledge and skills to master cross-domain strategies characterised by agile and asymmetrical thinking. This will necessitate robust–frequently updated–communication and information systems. Cognitive superiority in a military sense, which revolves around strategic anticipation and situational awareness, is claiming the position of being a prime beneficiary of DT, contributing to NATO's immutable defence and deterrence postures. Equality and adaptive capacity to ensure resilience, is another clear gain from DT.

Digital will not only rewire the warfare agenda, but will also

trust with partner nations and stakeholder organisations. Furthermore, counteracting, and neutralising disinformation campaigns will also be a byproduct of DT.

CONCLUSION

NATO's Warfare Development Agenda is undergoing a seismic shift, driven by the potent combination of innovation and digital technologies⁸. From the battlefields to cyberspace, from the training grounds to global narratives, every facet of NATO's operations is being reshaped. As these technologies continue to evolve, so will NATO's strategies. From understanding future challenges to driving innovation and ensuring interoperability, ACT's role is comprehensive. As NATO continues its journey of digital transformation, ACT is also contemplating how the wider innovation landscape is morphing, and thus, is ensuring the alliance remains robust, relevant, and ready to tackle the challenges of the 21st century.

NATO continues to sharpen its innovation-edge. A recent NATO-backed € 1bn venture capital fund plans to inject some financial firepower into defence

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